ZXF

Spectrum computing today

SUMMER 2002/Issue 1

PRICE LIST

New:

PC-PSU with supply for 2 Floppies and MB02	36,00 €
MB02-Printerlead	13,00 €
Spectrum +2A, new and original package, complete	220,00 €
Diskinterface D80 + Flopppy for Didaktik or Spectrum	111,00 € KS
B-Laufwerk for D80	60,00 € KS
Proface AT Extern (Keyboardinterface for connecting PC-Keyboards to Spectrum)	55,00 € KS
Proface AT intern	52,00 € KS
Melodik AY-Soundbox (unboxed)	21,00 € KS
128k upgrade Kit for 48k (only Hardware Specialists)	21,00 € KS
128k upgrade Kit incl. building inside (send Spectrum board)	52,00 € KS
Mice Maus (Mouse using Kempston Port)	25,00 € KS
+2 Cassetterecorder	36,00 €
Floppy Disc drive (1,86 with MB02, 720k with Opus, 780k with +D) Please specify	24,00 €
PSU for +2A/B and +3 or PSUl for +2 (also 48k and 128k) Please specify	31,00 €
FDD lead for 2 drives	4,00 €
Microdrive	25,00 €
Multiface 128 (working also on 48k)	26,00 €
Dust Cover 48k+/128k	8,00 €
Keyboard membrane 48k	11,00 €
Keyboard membrane Spectrum +/128k, new quality, not aging	21,00 €
Printer Ink Ribbon original STAR LC 10 , Doublepack 2 pieces	11,00 €
Microdrive Cartridges (ex-software)	3,50 €
Plus 3 Tapelead	10,50 €
Spectrum +2 Lightpen	36,00 €
Spectrum +3 Lightpen	27,00 €
Silverpaper for ZX Printer	5,00 €
Phaser-Pistole with Software (Tape or +3)	20,00 €
+3 drive belt	2,00 €
Wafadrive Cartridges 16K= 7,00 €, 32K= 7,50 €, 64K 8,00 €	

Used:

Sinclair ZX Spectrum 128k, complete with all cables	144,00 €
Sinclair ZX Spectrum +2, complete with all cables	70,00 €
Sinclair ZX Spectrum +2A, complete with all cables	65,00 €
Sinclair ZX Spectrum +3, built in 3li drive, complete with all cables	100,00 €
Sinclair Spectrum 48k (Gummy), complete with all cables + Introduction Tape	64,00 €
Sinclair Spectrum 48k +, complete with all cables + Introduction Tape	64,00 €
+3 Drive (tested)	74,00 €
Interface I	62,00 €
Opus Discovery Diskinterface with 1 x 720k Drive (new ROM)	118,00 €
Joystickinterface 1-Port 3,00 € 2-Port 11,00 €	
Joystick (many different)	2,50 €
Sinclair SJS-Joystick (+2/+3)	6,00 €

Also we have a lot of Software offers and books. Please contact us and we will send you our pricelist.

Products marked with 8BC or KS are sold in the name of 8-Bit Company or Kompakt Servis. We organise the business.

Prices excluding postage. Delivery as long as stock lasts.

Contents

Important! This is a *trial issue*. I've thoroughly enjoyed myself producing this little bundle of pages and I'm more than happy to keep on doing this into the future; I'm not going to, however, if nobody likes it. If you enjoy **ZXF** and you want it to continue then consider yourself duty bound to let me know this (mail@cwoodcock.co.uk). All other feedback will be gratefully received also - criticisms (please be kind), improvement suggestions and notifications of any errors you think you've spotted are essential for this sort of project to succeed.

This issue has been entirely put together by me. It was great fun, however it's not a level of input I anticipate being easy to maintain in the future. If you would like to contribute to future issues of ZXF - even if it's just to write a letter - **please do**; contact me again by the email address above.

edit

The ZX Spectrum lives on...

...if anything, it's getting stronger. Over the past few years I've been on something of a journey. It all started in 1994 I think, when I bought a copy of Gerton Lunter's **Z80** for my ageing 286 and started reliving the 'Spectrum experience' on its monochrome monitor. Sluggish on that particular machine though it was, Z80 positively flew when I upgraded to a second hand 486 two years later. When I bought my first Pentium in late 1998, however, it stopped altogether, protesting that the computer I was trying to run it on was simply too fast. That was also the time when I made my first connection to the Internet...

When I first published **ZX Format** on the web (in the year 2000) I was still very firmly in 'retro-mode,' overwhemled by the sheer amount of emulators and Spectrum software available on the net, yes, but viewing this all ultimately as just a number of people coming together to speak fondly of their past. The subtitle of my site was *Remembering the ZX Spectrum*. But then I really started learning. I discovered comp.sys.sinclair first of all - and that then alerted me to the existence of the demo scene, which I started then to explore with increasing amazement. I discovered the trade in Spectrum hardware at **ebay** and the range of new devices being developed for the machine today: the +3e hard disk interface and ROMs, the Proface PC keyboard interface, the new Spectrum+ wearproof keyboard membrane; to name but a few. I discovered Spectrum classics being remade as modern PC games and vice versa. I discovered endless software projects - for the PC and the original machine itself. I discovered the eastern European clones and their tremendous contribution to the longevity of the Spectrum spirit. And very quickly I

began to realise that my plea for the Spectrum to be remembered was more than a little superfluous, for with all this going on, there was no danger of it being forgotten whatsoever.

So the subtitle of **ZXF** is *Spectrum Computing Today*, which is exactly what I want this magazine to reflect. At the cutting edge of computing technology some might consider the likes of the ZX Spectrum best only remembered, perhaps through an ocassional game of Manic Miner on an emulator; but this is in fact an active and developing scene - no longer just a thing of the past for me - and remembering is only part of what it's all about.

I want to learn more about the ZX Spectrum, that special little machine that I grew up with and continue to enjoy. It doesn't matter that it's old: I don't expect it - or desire it - to be 'state-of-the-art' anymore. And the way I personally learn best about something is to write about it. So here is ZXF: my small contribution to the Spectrum world and the next step in my journey.

Colin Woodcock

mail@cwoodcock.co.uk

new

Windows +3e

> New ROMs for the Spectrum +3e

Hot on the heels of version 1.04, version 1.10 of Garry Lancaster's +3e ROMs offers new streams and channels for you to play with using the **OPEN #** command, the most interesting of these being windows!

With a choice of 48 different character styles, justification, automatic scrolling and all the usual **INK** and **PAPER** type controls, Lancaster's windows offer a powerful way of displaying text output. They even overlap!

For more information on the +3e see the feature on page 18. Check out also **www.z88forever.org.uk/zxplus3e/**
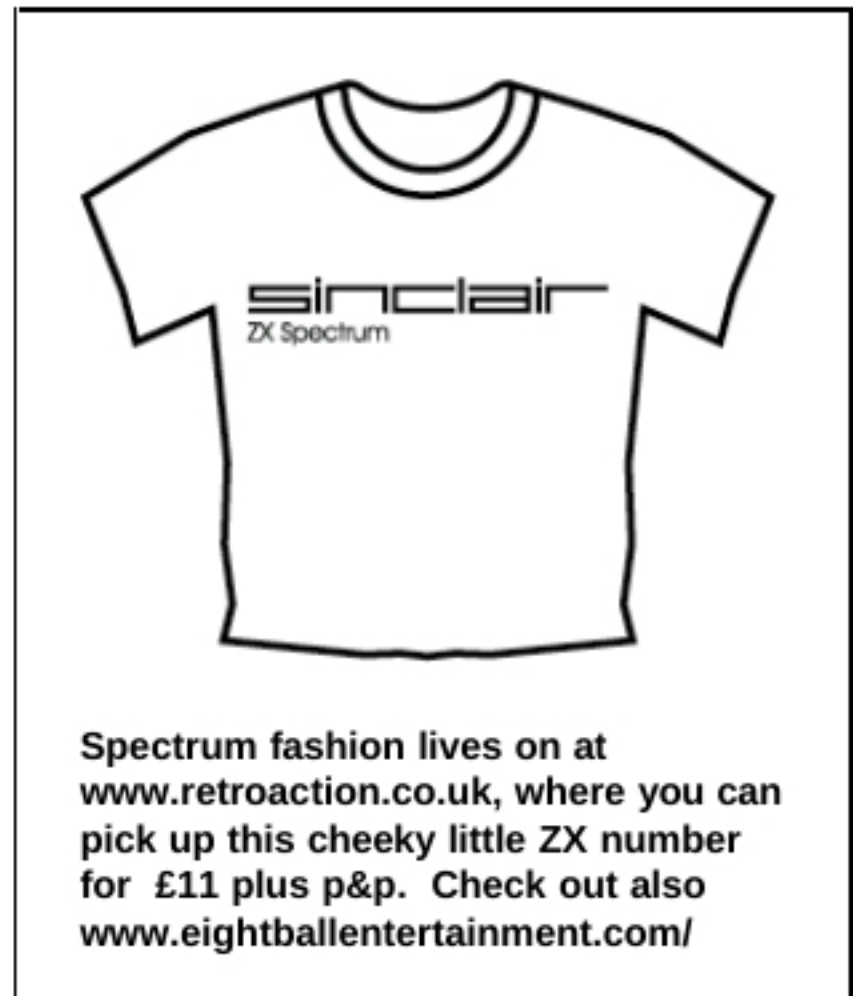
> Windows: where does he get his ideas from?
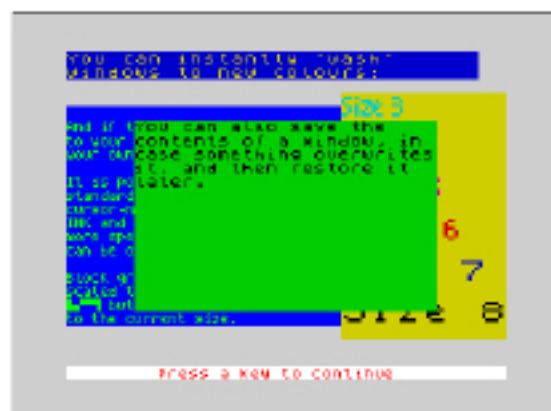
English succession

> German magazine hits UK

Suc-Session, the long running magazine of the Spectrum-User-Club in Germany, will now be sold in both German and English versions. Translated by Ian Spencer and Natalie Mayer, the January/February 2002 issue can be downloaded for free as a sampler from **www.sintech-shop.de/home/ spectrum-user-club.htm** and features news, interviews, game tips and articles.

Spectrum fashion lives on at www.retroaction.co.uk, where you can pick up this cheeky little ZX number for £11 plus p&p. Check out also www.eightballentertainment.com/

ebay in May

> Look at what you could have won

The computers themselves aside, what about this little lot for an ebay find in May:

- Sinclair Interface One & Microdrives
- Sinclair Interface 2
- Sinclair ZX81/Spectrum Printer and paper
- Rotronics Wafadrive
- Video Vault "Clive Drive"
- Datel Plus D Interface and disk drive
- dk'tronics 48k ZX Spectrum Lightpen
- Nidd Valley DigiMouse and software
- Cheetah SpecDrum
- Rombo VIDI-ZX Video Digitiser
- Prism VTX 5000 modem
- Kempston Pro JS Interface
- Sinclair Spectrum Light Gun

High prices this month:

- 48k Spectrum - boxed and unused - £166
- Boxed Spectrum 128 Heatsink - £104
- "ZX Spectrum Expansion System" £92
- Complete set of Ultimate games £122

n e w

Retro's not what it used to be

> New look for Retrospec

The site regarded by many as *the* place on the web for game remakes has had itself a makeover. The redesigned **www.retrospec.org** launched on 18 April and has taken a move away from its exclusively Spectrum roots towards the 8-bit scene more generally (many of its existing titles, after all, were released in other formats originally).

Of the many games available for free download, the very latest addition is Graham Goring's remake of Raffaele Cecco's **Cybernoid 2** (see page 10 for a full review of this title). There are also a few new screenshots to drool over of Jeff Braine's **SabreWulf** remake - still under development, but looking absolutely gorgeous (and not to be confused with Kieran and Declan Sandwell's remake of the same title reviewed on page 11).

Above: The new-look Restrospec: damn those guys are good.

Below: SabreWulf - it just looks too good to be true. Tell me it's real. Please...

Harrier Attacks

> Durell classic remade

Pavel Dovgaluk has brought Durell's *Harrier Attack!* to the PC. A near exact facsimilie of the Spectrum original, the new version only strays beyond eight colours to include a scan of the original cassette inlay cover. Ultra smooth scrolling and a complete absence of colour clash, however, are the subtle signs of careful and loving improvement. So you can now fly your plane behind a cloud... and not turn white. Progress takes on many forms. Download it at **http://harrierattack.narod.ru/**

Emulator news

SPECTACULAR SPECTACULATOR

Jonathan Needle's 48k Spectrum emulator *Spectaculator* has hit version 2.0, with new support for multi-channel sound and multicolour graphics. Also new to this version is support for TAP and TZX cassette file formats, managed via an innovative 'virtual cassette recorder'. *Spectaculator* comes with a small games pack featuring seven classic titles, including The Hobbit and the ubiquitous Manic Miner; the games come with their own help files in text or HTML format which can be accessed from the main *Spectaculator* help menu: at last we have an emulator capable of telling us which keys to hit! Creating a new help file for your own Speccy favourite is a simple matter of putting together a web page (or text file) and saving it in the same folder as the game file with the same name as the game itself. Clever. *Spectaculator* is one of the newest emulators about at present, but showing a great deal of promise. Find out more at **http://www.spectaculator.com/**

REAL DEVELOPMENTS

No sign of the much awaited Windows version as yet, but **Ramsoft**'s mighty *RealSpectrum* 48/128k emulator made it to version 0.94.22 (beta 12) in April. By Ramsoft's own admission, this is a fairly uneventful update, but one which - in addition to numerous bug fixes and other tweakings - achieves perfect floating bus emulation for the first time. Clearly the Ramsoft staff are rather chuffed with themselves on this and have produced a technical report explaining it all at **www.ramsoft.bbk.org/floatingbus.html**.

SPINNING AROUND

SPIN (SPectrum INterpretor) is a new Spectrum emulator under development by Paul Dunn (aka Dunny) and Mark Woodmass (aka Woody), and has just reached version 0.2a. Already acclaimed as one of the nicest looking Spectrum emulators, SPIN is developing at quite a speed, new versions being released practically every other week (by the time your read this I've no doubt several new versions will have been released since 0.2a), and is shaping up as an extremely competent emulator to rival the likes of RealSpectrum. Many users are in fact reporting it to have become their emulator of choice to replace **ZX32** (not updated since April 2000).

Once complete, SPIN will feature support for the new RZX recording format, allowing you to record your own key presses and thereby ensure that record-breaking game of RoboCop of yours is never forgotten. RZX is due to replace as the standard the AIR format previously employed for this purpose: due to the way in which timings were calculated, an AIR file could only be played back using the emulator software which created it (ie, a recording created on RealSpectrum, for example, could only be played on RealSpectrum and not on other emulators supporting AIR file recording); RZX files, however, are fully portable and can be replayed on any RZX supporting emulator.

Mark Woodmass is known for his own emulator, *SpecEmu*, which he will now no longer be developing (version 1.3 can still be download from **www.geocities.com/specemu/**, but is no longer supported). Meanwhile, SPIN itself can be downloaded from **http://homepage.ntlworld.com/paul.dunn4/SPIN.Zip**.

new

Graphics galore

> New editor in alpha

Jaime Tejedor Gómez, otherwise known - I'm given to understand - as **Metalbrain**, has released version 0.4 of his new Spectrum graphics editor for the PC, *SevenuP*. A fair way from completion it might be, but SevenuP - a Windows based program - looks extremely promising indeed. Already accepting the standard .SCR screen$ file format, this is a serious editor for the creation of new Spectrum art. SevenuP even adds in the appropriate colour clash as you draw.

Announcing the alpha in **comp.sys.sinclair** some weeks ago, Metalbrain described some of his plans for future versions, which includes support for sprites and animations. SevenuP is available for download for both Windows and Linux; respectively these can currently be found at **http://eqquinox.com/ usuarios/metalbrain/speccy/SevenuP-v0.1 .ziP** and **http://eqquinox.com/ usuarios/metalbrain/speccy/ SevenuP-dyn-v0.1.bz2**

Meanwhile, **Alexander Shabarshin** has just released version 1.1 of his DOS based Spectrum graphics emulator, **SCRED** (SCR-EDitor), which, along with the C++ sources, can be downloaded from **http://shaos.ru/nedopc/zx/index.htm** at a mere 55kb on the road. Choice is our bounty. Now can someone please tell me how to convince my PC that something ending in .SCR is not necessarily a screensaver**?**
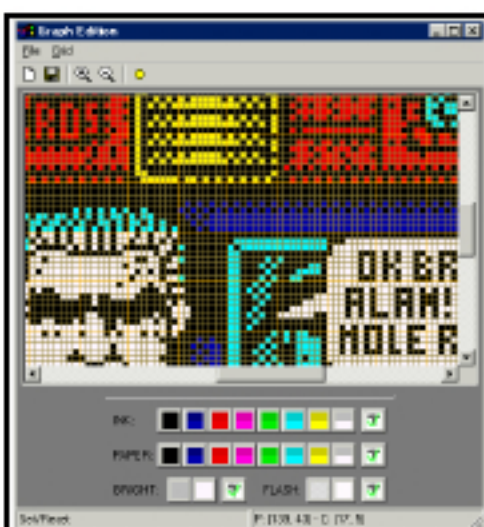
< SevenuP

The King of Crap

> CSSCGC results are in

The winner of the **comp.sys.sinclair** Crap Games Competition (CSSCGC) 2001 has finally been announced. Hurrah! Just when the regulars were starting to wonder what had become of this, the sixth annual celebration of the standard of Spectrum programming most infamously established by the **Cascade Cassette 50**, this year's host - Adam D Moss - bounced in to declare **Fire Electric Pen** by Joe MacKay the current champion of Spectrum smelliness. Says Judge Adam of Fire Electric Pen, *"the game combines disarming Engrish with a fundamentally appalling idea realized very frustratingly "*

Runners up this year were Tomaz Cedilnik's **Wild West Head Hunter** (*"The first entry of the year's compo to promise so much and deliver laughably little, and one of the very best submissions in that vein"*) and Pablo & Jaime Tejedor's **Games With Frontiers**. Download the lot from **http://www.ygv50. dial.pipex.com/csscgc/**. Previous years' entries can be accessed from **http://homepages.enterprise.net/ cavan/ysac/cgi-bin/csscgc.cgi**, and if you're tempted to have a go in the 2002 competition, you can find an online guide to creating a crap game at **http:// www.unsatisfactory.freeserve.co.uk/ crap.html**.

It's not escaped the attention of many CSSCGC players that some of the competit-ors over the years have shown blatent disregard for the rules of this sport, turning in entries that are actually quite good. One such observer is Chris Cowley (author of vbSpec) whose new site, **Speccy Game 2002**, aims to put all this talent to a use. So far the only entry for the competition is Chris' own **Bastris** (listing on page X), but I gether there's time yet to submit a game - so get programming and submit your entries at **http://freestuff.grok.co.uk/game-compo/**.

Fist returns

> New remake in progress

Was there ever a correlation between the keys you pressed in **The Way of the exploding fist** and the subsequent movements of your karate fellow on the screen? Was there my a**e. But boy was that game fun. And now, Melbourne House's aussie classic is being remade by **sés** for us lucky PC users. So far only the first demo has been released, but it's enough to wet the appetite for sure. Soon you'll be able to duff up your mates the old fashioned way. Check it out at **http://ses.mgbr.net/.**

Changing fonts

> Spectrum typeface madeover

Not a new Windows Spectrum font - oh no. **Paul van der Laan's Clairsys** is a replacement for the good old Speccy typeface, never known - let's be honest here - for its elegance. The font has been built into new ROM files available from **www.type-invaders.com/zxspectrum/** for use with an emulator (if you were really clever I suppose you could blow these onto EPROMs and use them with a real Speccy); there's also a .TAP file for emulators that don't separate out the ROMs from the main program code.

2002 Tour due soon

> ST2002 announced

The Speccy games tournament is back and will run from 16 September to 2 December this year. At the time of writing the specific games have yet to be decided, but Aleksandar Lukic (winner of ST2001), announcing the tour in **comp.sys.sinclair**, has expressed a preference this year for a shift towards "genuine Speccy games" rather than coin-op conversions. The new tour will not this year be overseen by Michael Bruhn, who ran both the 2000 and 2001 predecessors.

With RZX still under development, no decisions have yet been made as to how game performances will be recorded (and submitted); the current concensus appears to be to wait until a week before the tour begins and see what's available then. Last year saw the use of the AIR format for the first time, however due to AIR's portability problems this meant all entrants had to use the **Real Spectrum** emulator to ensure compatibility.

"Open your eyes"

"Oh... wow... it's so... different... I love the n... oh look - they kept the a..."

Sinclair < old

Sinclair < new

Load

Cybernoid 2 (PC)

Programming: Graham Goring
Graphics: John Blythe
Level design: Russell Hoy
Music: Will Morton
Download it from: www.retrospec.org

I have to confess, my early Spectrum days were almost at an end when Raffaele Cecco's sequel to Cybernoid hit the shelves in Autumn 1988. My planned SAM Coupe was starting to occupy my thoughts pretty seriously by this stage and this release just passed me by completely. When I downloaded this remake I therefore had to download the original from WOS also, just to see what it was like.

Which is where I encountered the first rather startling thing about this remake - it *feels* almost exactly the same as the original. Not being a games programmer myself, I don't know how easy or difficult this is - but I was well impressed all the same.

In the original Cybernoid your job was to retrieve stolen cargo plundered by nasty pirates; Cybernoid 2 sees those blighters' return and yet more goods to be recovered. In a nutshell your job is to fly around the five levels of the pirates' base and shoot pretty much everything you see, not forgetting, of course, to pick the cargo up along the way. Your ship is positively brimming with weapons, from rockets to heat seeking missles to bouncing bombs - all of which, mercifully, are replenished each time you die.

Graham Goring's remake is programmed in Blitz Basic (fast establishing itself as a favourite language for remakes, although some CSSers have reported problems running Blitz games on their systems). The graphics are colourful and detailed, whilst remaining faithful to the original. Animation is smooth and groovy. But where Cybernoid 2 really scores for me is with its music and sound effects. Will Morton's funky *Ba badaba ba badaba ba bum* that accompanies your efforts as you fly from screen to screen stays with you long after you've shut the game (and the computer) down, and I particularly like the twangy 'ping' that your laser bolts make when they

bounce off the metal walls.

Cybernoid 2 is a fairly tough game for lightweights like myself; that hasn't stopped me coming back to it time and time again, however. And I can see this continuing until the game is done, which means it had better make itself at home on my hard disc; it's going to be around for some time.

The Spectrum original and the remake.

VERDICT

Graphics	8
Sound	9
Playability	8
Addictiveness	8
Overall	**8**

Sabre Wulf (PC)

Authors: Kieran and Declan Sandwell
Download it from: www.dexfx.pwp.blueyonder.co.uk/ss/

Down and down I plunged, through Rocky Glades, Steep Ravines and Shady Hollows...No grip, no footholds, slipping, tumbling, spinning, darker and darker, deeper and deeper...

Sabre Wulf, you have a special place in my memories. Officially the first 48k Spectrum game I ever saw, I remember to this day being blown away by the amount of colour Ultimate had managed to pack onto the screen, and by the number of screens there were too. But quite apart from these technical accomplishments, there was an aesthetic appeal that I've rarely found in games since: Sabre Wulf had atmosphere.

I don't think I'm alone in this feeling, looking at the Sandwell brothers' Blitz Basic remake of the game Ultimate released to a public they considered 'not ready' for its sequel (Underwurld). The moody jungle soundtrack of bird and insect symphony tunes into this atmosphere perfectly; loading up the game for the first time and listening to it I immediately felt that this bit was right.
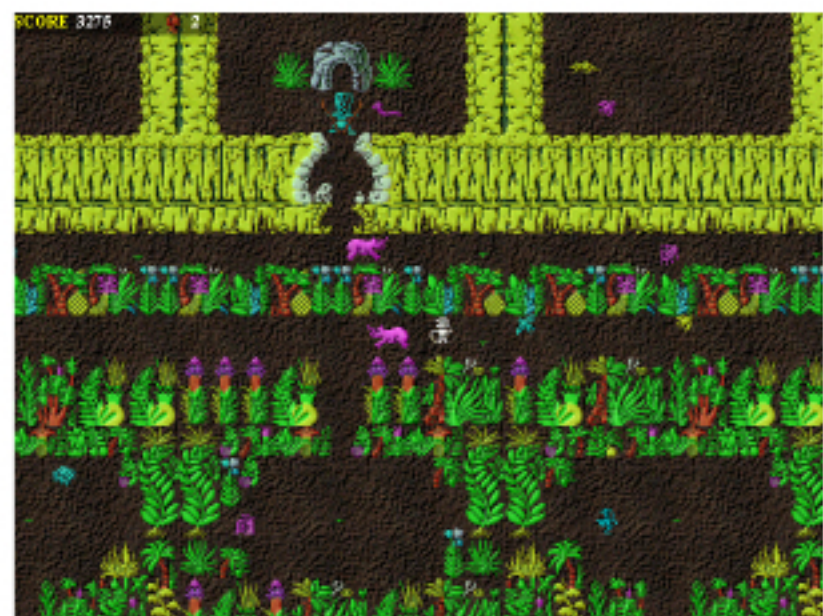
Kieran and Declan have done a thoughtful job at updating the graphics to this title, choosing to keep the various sprites (jungle beasties you are required to shake your pointy stick at, the 'power changing' orchids and - of course - Sabreman himself), plants, caves and mountains in pretty much their original forms and colours, tweeking them very subtley to add depth to the action. The main sound effects have been preserved without alteration. Perhaps the most significant change is that remake expands the original viewing area by shrinking everything down in size so that you can now see much further ahead than you could before.

It's great to see remakes coming from new places - long may this continue, say I - as software such as Blitz Basic gives programming access to a wider population of aspiring authors. This is a good remake of a classic title that brings back many happy memories as I play it. For me, personally,

the graphics are a little to sharp to capture fully the visual atmosphere that the original created, and enlarging the viewing area has made the jungle feel less overwhelming, and appear more orderly and structured than one feels a jungle perhaps should. But these are minor gripes. Come on - it's Sabre Wulf; what more do I need to say?

The Spectrum original and the remake.

VERDICT	
Graphics	7
Sound	9
Playability	7
Addictiveness	7
Overall	**7**

List

Sorry, but this just wouldn't be a Spectrum magazine without a program listing. That's my baggage, ok? Welcome to BASTRIS (the name works on so many levels), by Chris Cowley, his own entry in his own **Speccy Game 2002** competition. Think you can do better? Well you just make your way to **http://freestuff.grok.co.uk/game-compo/** and prove it buddy.

```
# BASTRIS v0.1
#
# (c) 2002 Chris Cowley
# February 2002
#
# Use zmakebas from http://
      rus.members.beeb.net/
      zmakebas.html to strip out
# the '#' comments and turn this into
      a Speccy .TAP file!

 10 REM BASTRIS (c)2002 Chris Cowley
 20 GOSUB 9700
 30 GOSUB 9500
 40 GOSUB 4700
 50 LET Piece=INT(RND*7)+1: LET
      rot=0
 60 GOSUB 3900 + Piece * 100 + Rot * 10
 70 LET y=1: LET x=14: LET newx=x:
      LET IsBottom=0
 80 GOSUB 3800
 90 GOSUB 3100
100 GOSUB 3000
110 IF IsBottom AND y=1 THEN GOTO 200
120 IF IsBottom THEN GOSUB 2000:
      GOTO 50
140 GOSUB 3850
150 LET y=y+1: LET x=newx
160 GOTO 80

#
# Game Over
#
200 PRINT AT 9,10;INK 2; PAPER
      1;"\b\o\o\o\o\o\o\o\o\o\o\c"
210 PRINT AT 10,10;INK 2;"\o";INK
      7;"Game Over";INK 2;"\o"
220 PRINT AT 11,10;INK 2; PAPER
      1;"\d\o\o\o\o\o\o\o\o\o\o\e"
230 INK 6: PAPER 0: FLASH 1: GOSUB
      9800
240 IF INKEY$<>"" THEN GOTO 240
250 FOR N=1 TO 1400: NEXT N
260 GOTO 30

#
# Check for completed lines
```

```
#
2000 FOR N=1 TO 20
2010 LET Row=-1
2015 FOR M=11 TO 20
2020 IF PEEK(22528+M+N*32) = 0 THEN
      LET Row=0: LET M=20
2025 NEXT M
2030 IF Row THEN GOSUB 2100
2040 NEXT N
2050 RETURN

#
# Remove Row N
#
2100 FOR R=N TO 1 STEP -1
2105 LET Row=0
2110 FOR M=11 TO 20
2115 POKE
      22528+M+R*32,PEEK(22528+
      M+(R-1)*32)
2118 IF PEEK(22528+M+R*32)<>0 THEN
      LET Row=-1
2120 NEXT M
2122 IF NOT Row THEN LET R=1
2125 NEXT R
2130 LET Lines=Lines+1
2135 IF Lines>9999 THEN PRINT AT
      4,24;Lines: RETURN
2140 IF Lines>999 THEN PRINT AT
      4,25;Lines: RETURN
2145 IF Lines>99 THEN PRINT AT
      4,26;Lines: RETURN
2150 IF Lines>9 THEN PRINT AT
      4,27;Lines: RETURN
2155 PRINT AT 4,28;Lines
2160 BEEP .1,40
2170 RETURN

#
# Is the current piece "Bottomed Out"
      (F'NAR!)
#
3000 LET p1=x+b(1,1)+(y+b(1,2))*32
3002 LET p2=x+b(2,1)+(y+b(2,2))*32
3004 LET p3=x+b(3,1)+(y+b(3,2))*32
3006 LET p4=x+b(4,1)+(y+b(4,2))*32
3010 LET n1=p1+32: LET n2=p2+32: LET
```

```
       n3=p3+32: LET n4=p4+32
3020 IF n1<>p2 AND n1<>p3 AND n1<>p4
     AND PEEK(22528+n1) <> 0 THEN LET
     IsBottom=-1: RETURN
3030 IF n2<>p1 AND n2<>p3 AND n2<>p4
     AND PEEK(22528+n2) <> 0 THEN LET
     IsBottom=-1: RETURN
3040 IF n3<>p1 AND n3<>p2 AND n3<>p4
     AND PEEK(22528+n3) <> 0 THEN LET
     IsBottom=-1: RETURN
3050 IF n4<>p1 AND n4<>p2 AND n4<>p3
     AND PEEK(22528+n4) <> 0 THEN LET
     IsBottom=-1: RETURN
3060 RETURN

#
# Read Keys + action them
#
3105 IF IN 57342=254 THEN GOTO 3200
3110 IF IN 57342=253 THEN GOTO 3300
3115 IF IN 64510=254 THEN GOTO 3400
3120 IF IN 65022=254 THEN GOTO 3500
3125 RETURN

### Move Right ###
3200 LET low=0
3202 IF b(1,1) > low THEN LET
     low=b(1,1)
3204 IF b(2,1) > low THEN LET
     low=b(2,1)
3206 IF b(3,1) > low THEN LET
     low=b(3,1)
3208 IF b(4,1) > low THEN LET
     low=b(4,1)
3210 IF b(1,1)=low AND PEEK
     (22528+x+b(1,1)+1+((y+b(1,2))
     *32)) <> 0 THEN RETURN
3212 IF b(2,1)=low AND PEEK
     (22528+x+b(2,1)+1+((y+b(2,2))
     *32)) <> 0 THEN RETURN
3214 IF b(3,1)=low AND PEEK
     (22528+x+b(3,1)+1+((y+b(3,2))
     *32)) <> 0 THEN RETURN
3216 IF b(4,1)=low AND PEEK
     (22528+x+b(4,1)+1+((y+b(4,2))
     *32)) <> 0 THEN RETURN
3220 LET newx=x+1
3230 RETURN

### Move Left ###
3300 LET low=3
3302 IF b(1,1) < low THEN LET
     low=b(1,1)
3304 IF b(2,1) < low THEN LET
     low=b(2,1)
3306 IF b(3,1) < low THEN LET
     low=b(3,1)
3308 IF b(4,1) < low THEN LET
     low=b(4,1)
3310 IF b(1,1)=low AND PEEK
     (22528+x+b(1,1)-1+((y+b(1,2))
     *32)) <> 0 THEN RETURN
3312 IF b(2,1)=low AND PEEK
     (22528+x+b(2,1)-1+((y+b(2,2))
     *32)) <> 0 THEN RETURN
3314 IF b(3,1)=low AND PEEK
     (22528+x+b(3,1)-1+((y+b(3,2))
     *32)) <> 0 THEN RETURN
3316 IF b(4,1)=low AND PEEK
     (22528+x+b(4,1)-1+((y+b(4,2))
     *32)) <> 0 THEN RETURN
3320 LET newx=x-1
3330 RETURN

### Rotate ###
3400 LET Rot=Rot+1: IF Rot=4 THEN LET
     Rot=0
3405 GOSUB 3850
3410 GOSUB 3900 + Piece * 100 + Rot *
     10
3412 LET Low=11
3414 IF x+b(1,1) < Low THEN LET Low =
     x+b(1,1)
3416 IF x+b(2,1) < Low THEN LET Low =
     x+b(2,1)
3418 IF x+b(3,1) < Low THEN LET Low =
     x+b(3,1)
3420 IF x+b(4,1) < Low THEN LET Low =
     x+b(4,1)
3422 IF Low < 11 THEN LET x=11: LET
     newx=11: GOSUB 3800: RETURN
3424 LET Low=20
3426 IF x+b(1,1) > Low THEN LET Low =
     x+b(1,1)
3428 IF x+b(2,1) > Low THEN LET Low =
     x+b(2,1)
3430 IF x+b(3,1) > Low THEN LET Low =
     x+b(3,1)
3432 IF x+b(4,1) > Low THEN LET Low =
     x+b(4,1)
3434 IF Low > 20 THEN LET x=x+20-Low:
     LET newx=x
3436 GOSUB 3800
3440 RETURN

### Drop ###
3500 GOSUB 3850
3510 GOSUB 3000
3520 IF IsBottom THEN GOSUB 3800:
     RETURN
3530 LET y=y+1
3540 GOTO 3510

#
# Draw Piece
#
3800 POKE 22528+x+b(1,1)+((y+b(1,2)
     )*32),71+Piece*8
```

list

```
3805 POKE 22528+x+b(2,1)+((y+b(2,2)
     )*32),71+Piece*8
3810 POKE 22528+x+b(3,1)+((y+b(3,2)
     )*32),71+Piece*8
3815 POKE 22528+x+b(4,1)+((y+b(4,2)
     )*32),71+Piece*8
3820 RETURN

#
# Undraw Piece
#
3850 POKE
     22528+x+b(1,1)+((y+b(1,2))*32
     ),0
3855 POKE
     22528+x+b(2,1)+((y+b(2,2))*32
     ),0
3860 POKE
     22528+x+b(3,1)+((y+b(3,2))*32
     ),0
3865 POKE
     22528+x+b(4,1)+((y+b(4,2))*32
     ),0
3870 RETURN

# Square Piece Rotations
##########################
4030 LET b(1,1)=1: LET b(1,2)=1: LET
     b(2,1)=2: LET b(2,2)=1: LET
     b(3,1)=1: LET b(3,2)=2: LET
     b(4,1)=2: LET b(4,2)=2: RETURN

# Long Piece Rotations
############################
4100 LET b(1,1)=0: LET b(1,2)=1: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=2: LET b(3,2)=1: LET
     b(4,1)=3: LET b(4,2)=1: RETURN
4110 LET b(1,1)=2: LET b(1,2)=0: LET
     b(2,1)=2: LET b(2,2)=1: LET
     b(3,1)=2: LET b(3,2)=2: LET
     b(4,1)=2: LET b(4,2)=3: RETURN
4120 LET b(1,1)=0: LET b(1,2)=2: LET
     b(2,1)=1: LET b(2,2)=2: LET
     b(3,1)=2: LET b(3,2)=2: LET
     b(4,1)=3: LET b(4,2)=2: RETURN
4130 LET b(1,1)=1: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=1: LET b(3,2)=2: LET
     b(4,1)=1: LET b(4,2)=3: RETURN

# T-Piece Rotations
######################
4200 LET b(1,1)=1: LET b(1,2)=1: LET
     b(2,1)=0: LET b(2,2)=2: LET
     b(3,1)=1: LET b(3,2)=2: LET
     b(4,1)=2: LET b(4,2)=2: RETURN
4210 LET b(1,1)=1: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=2: LET b(3,2)=1: LET
     b(4,1)=1: LET b(4,2)=2: RETURN
4220 LET b(1,1)=1: LET b(1,2)=1: LET
     b(2,1)=2: LET b(2,2)=1: LET
     b(3,1)=3: LET b(3,2)=1: LET
     b(4,1)=2: LET b(4,2)=2: RETURN
4230 LET b(1,1)=2: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=2: LET b(3,2)=1: LET
     b(4,1)=2: LET b(4,2)=2: RETURN

# L-Piece Type 1 Rotations
###############################
4300 LET b(1,1)=1: LET b(1,2)=0: LET
     b(2,1)=2: LET b(2,2)=0: LET
     b(3,1)=2: LET b(3,2)=1: LET
     b(4,1)=2: LET b(4,2)=2: RETURN
4310 LET b(1,1)=2: LET b(1,2)=0: LET
     b(2,1)=0: LET b(2,2)=1: LET
     b(3,1)=1: LET b(3,2)=1: LET
     b(4,1)=2: LET b(4,2)=1: RETURN
4320 LET b(1,1)=1: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=1: LET b(3,2)=2: LET
     b(4,1)=2: LET b(4,2)=2: RETURN
4330 LET b(1,1)=0: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=0: LET
     b(3,1)=2: LET b(3,2)=0: LET
     b(4,1)=0: LET b(4,2)=1: RETURN

# L-Piece Type 2 Rotations
###############################
4400 LET b(1,1)=1: LET b(1,2)=0: LET
     b(2,1)=2: LET b(2,2)=0: LET
     b(3,1)=1: LET b(3,2)=1: LET
     b(4,1)=1: LET b(4,2)=2: RETURN
4410 LET b(1,1)=0: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=0: LET
     b(3,1)=2: LET b(3,2)=0: LET
     b(4,1)=2: LET b(4,2)=1: RETURN
4420 LET b(1,1)=1: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=0: LET b(3,2)=2: LET
     b(4,1)=1: LET b(4,2)=2: RETURN
4430 LET b(1,1)=0: LET b(1,2)=0: LET
     b(2,1)=0: LET b(2,2)=1: LET
     b(3,1)=1: LET b(3,2)=1: LET
     b(4,1)=2: LET b(4,2)=1: RETURN

# S-Piece Type 1 Rotations
###############################
4500 LET b(1,1)=0: LET b(1,2)=1: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=1: LET b(3,2)=2: LET
     b(4,1)=2: LET b(4,2)=2: RETURN
4510 LET b(1,1)=2: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=2: LET b(3,2)=1: LET
     b(4,1)=1: LET b(4,2)=2: RETURN
```

```
4520 LET b(1,1)=0: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=0: LET
     b(3,1)=1: LET b(3,2)=1: LET
     b(4,1)=2: LET b(4,2)=1: RETURN
4530 LET b(1,1)=2: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=2: LET b(3,2)=1: LET
     b(4,1)=1: LET b(4,2)=2: RETURN

# S-Piece Type 1 Rotations
##############################
4600 LET b(1,1)=2: LET b(1,2)=1: LET
     b(2,1)=3: LET b(2,2)=1: LET
     b(3,1)=1: LET b(3,2)=2: LET
     b(4,1)=2: LET b(4,2)=2: RETURN
4610 LET b(1,1)=1: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=2: LET b(3,2)=1: LET
     b(4,1)=2: LET b(4,2)=2: RETURN
4620 LET b(1,1)=2: LET b(1,2)=1: LET
     b(2,1)=3: LET b(2,2)=1: LET
     b(3,1)=1: LET b(3,2)=2: LET
     b(4,1)=2: LET b(4,2)=2: RETURN
4630 LET b(1,1)=1: LET b(1,2)=0: LET
     b(2,1)=1: LET b(2,2)=1: LET
     b(3,1)=2: LET b(3,2)=1: LET
     b(4,1)=2: LET b(4,2)=2: RETURN

#
# Initialize Game Screen + Variables
#
4700 RANDOMIZE
4705 INK 0: BRIGHT 0: CLS
4710 PRINT AT 1,10; INK 1;"\f"; INK
     0;"\a\a\a\a\a\a\a\a\a\a"; INK
     1;"\f"
4715 FOR N = 2 TO 20: PRINT AT N,10;
     PAPER 1;" ";PAPER
     0;"\A\A\A\A\A\A\A\A\A\A";PA-
     PER 1;" ": NEXT N
4720 PRINT AT 21,10;INK
     1;"\D\O\O\O\O\O\O\O\O\O\O\E"
4725 PRINT AT 2,23; INK 5; BRIGHT
     1;"\B\O\O\O\O\O\C"
4730 PRINT AT 3,23; INK 5; BRIGHT
     1;"\O";INK 7;"Lines"; INK
     5;"\O";AT 4,23; INK 5;"\O"; INK
     7; BRIGHT 0; "00000"; INK 5;
     BRIGHT 1;"\O"
4735 PRINT AT 5,23; INK 5; BRIGHT
     1;"\D\O\O\O\O\O\E"
4740 LET Lines=0: Dim b(4,2)
4745 INK 7
4750 RETURN

#
# Front Screem
#
9510 BORDER 0: PAPER 0: INK 7: BRIGHT
     1: FLASH 0: CLS
9520 PRINT INK 2;"\o\o\o\c \b\o\o\c
     \b\o\o\c \o\o\o \o\o\o\c \o\o\o
     \b\o\o\c"
9522 PRINT INK 6;"\o  \o \o  \o \o    \o
     \o  \o  \o  \o"
9524 PRINT INK 4;"\o\o\o\p \o\o\o\o
     \d\o\o\c \o  \o\o\o\p  \o
     \d\o\o\c"
9526 PRINT INK 5;"\o  \o \o  \o    \o  \o
     \o  \o  \o    \o"
9528 PRINT INK 1;"\o  \o \o  \o \f \o
     \o  \o  \o  \o  \f  \o"
9530 PRINT INK 3;"\o\o\o\e \o  \o
     \d\o\o\e  \o  \o  \o \o\o\o
     \d\o\o\e"
9540 INK 6
9542 PRINT AT 8,14;"Keys:";AT
     10,15;"\I \M"; AT 12,11;"\G\K
     \L\H"; AT 14,15;"\J \N"
9544 PRINT AT 17,4;"A "; CHR$(34) +
     "SpeccyGame 2002" + CHR$(34) + "
     Entry"; AT 18,9; BRIGHT 0;"By
     Chris Cowley"
9546 INK 7
9550 PRINT AT 21,5;"Press any key to
     start"
9560 IF INKEY$ <> "" THEN GOTO 9560
9565 RESTORE 9600
9570 FOR N=1 TO 158
9572 READ X,Y
9574 FOR M=1 TO X: IF Y > -12 THEN BEEP
     .011,Y
9576 IF INKEY$ <> "" THEN RETURN
9578 NEXT M
9580 NEXT N
9585 GOTO 9565

### Tune Data ###
9600 DATA
     8,0,4,12,4,15,4,6,8,5,4,12
9602 DATA
     8,0,4,12,4,15,4,6,8,5,4,12
9604 DATA 8,0,4,12,4,15,4,6,8,5
9606 DATA
     4,0,8,3,4,0,4,2,4,0,4,2,4,3,4
     ,2
9610 DATA
     8,0,4,12,4,15,4,6,8,5,4,12
9612 DATA
     8,0,4,12,4,15,4,6,8,5,4,12
9614 DATA 8,0,4,12,4,15,4,6,8,5
9616 DATA
     4,0,8,3,4,0,4,2,4,0,4,2,4,3,4
     ,2
9620 DATA
     8,5,4,17,4,20,4,11,8,10,4,17
9622 DATA
     8,5,4,17,4,20,4,11,8,10,4,17
```

list

```
9624 DATA 8,5,4,17,4,20,4,11,8,10
9626 DATA
     4,5,8,8,4,5,4,7,4,5,4,7,4,8,4
     ,7
9630 DATA
     8,0,4,12,4,15,4,6,8,5,4,12
9632 DATA
     8,0,4,12,4,15,4,6,8,5,4,12
9634 DATA 8,0,4,12,4,15,4,6,8,5
9636 DATA
     4,0,8,3,4,0,4,2,4,0,4,2,4,3,4
     ,2
9640 DATA
     4,0,4,0,4,0,4,0,4,0,4,0,8,10
9642 DATA
     4,0,4,0,4,0,4,0,4,0,4,0,8,9
9644 DATA
     4,0,4,0,4,0,4,0,4,0,4,0,4,8
9646 DATA
     8,3,4,0,4,2,4,0,4,2,4,3,4,2
9650 DATA
     4,0,4,0,4,0,4,0,4,0,4,0,8,10
9652 DATA
     4,0,4,0,4,0,4,0,4,0,4,0,8,9
9654 DATA
     4,0,4,0,4,0,4,0,4,0,4,0,4,8
9656 DATA
     8,3,5,0,6,2,6,0,6,2,8,3,16,2,
     22,0,180,-12,

#
# Initialize UDG's
#
9700 RESTORE 9740
9705 FOR N=USR "a" TO USR "p"+7
9710 READ x: POKE N,x
9715 NEXT N
9720 RETURN
# A - Block
9740 DATA
     250,192,128,128,128,0,128,0
# B - Top left corner
9742 DATA 0,7,31,63,127,255,255,255
# C - Top right corner
9744 DATA
     0,224,248,252,254,255,255,255
# D - Bottom left corner
9746 DATA 255,255,255,127,63,31,7,0
# E - Bottom right corner
9748 DATA
     255,255,255,254,252,248,224,0
# F - Top rounded piece
9750 DATA
     24,126,255,255,255,255,255,25
     5
# G - Left arrow <-
9752 DATA 16,48,126,254,126,48,16,0
# H - Right arrow ->
9754 DATA 16,24,252,254,252,24,16,0
```

```
# I - Rotate symbol @
9756 DATA
     121,255,231,207,192,194,246,12
     4
# J - Down arrow \/
9758 DATA 56,56,56,254,124,56,16,0
# K - Letter O
9760 DATA
     124,254,198,198,198,254,124,0
# L - Letter P
9762 DATA
     252,254,198,254,252,192,192,0
# M - Letter Q
9764 DATA
     124,254,198,198,206,255,127,0
# N - Letter A
9766 DATA
     124,254,198,254,254,198,198,0
# O - All the 1's (just for
     convenience rather than using
     spaces)
9768 DATA
     255,255,255,255,255,255,255,25
     5
# P - "<" Character using on front
     screen
9770 DATA
     254,248,240,128,128,240,248,25
     4

#
# Print number of Lines achieved
#
9800 PRINT AT 4,24;"00000"
9805 IF Lines>9999 THEN PRINT AT
     4,24;Lines: RETURN
9810 IF Lines>999 THEN PRINT AT
     4,25;Lines: RETURN
9815 IF Lines>99 THEN PRINT AT
     4,26;Lines: RETURN
9820 IF Lines>9 THEN PRINT AT
     4,27;Lines: RETURN
9825 PRINT AT 4,28;Lines
9830 RETURN
```

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int

Hard Drive

The evolution of the ZX Spectrum isn't over yet. Emulators are great, but they're just not the same as the feel of real Spectrum hardware quivering beneath your fingertips... sort of. If you're one of those born again few who want to go back to the unemulatable aesthetics of a genuine Speccy, but can't face the prospect of learning the art of chuntey balancing all over again, you just might be in luck. Garry Lancaster has taken Amstrad's Sinclair swansong to a whole new plane altogether. Prepare yourself for a Spectrum hard disk, and more...

What is the Spectrum +3e?

Basically, it's a combination of software and hardware (new ROMs and a hard disk interface) for the Spectrum +3 (or black +2A) which enhance it in various ways, by fixing bugs, and adding new features and commands. The ability to use hard disks on your Speccy is the most obvious new improvement, but it's not necessary to actually build an interface - the +3e ROMs have many useful extras that don't require hard disks at all.

ROMs? How do I get/fit new ROMs?

There's three ways to get the ROMs. First, if you are able to blow your own EPROMs, you can just download the latest version from the +3e website and do that. Or, you can send me 2 x 32K EPROMs (the required type is 27C256) and return postage and I'll do it for you. Finally, if you can't get hold of EPROMs yourself, I'll provide them complete with the latest version of the +3e ROMs for £10.

The website also contains a ROM file that can be used with the RealSpectrum emulator, which emulates the +3e complete with hard disk interface.

So where can I get EPROMs from? When I asked in Dixons they looked at me kind of funny...

Specialist electronics shops can supply them (Maplins, Target etc) but forget Tandy, as they stopped dealing in anything like that ages ago. A cheaper place to get them is out of old PCs - any largish chip on a motherboard/video card etc with a label on it is a likely suspect; just look for the magic 27256 numbers (probably liberally interspersed with other characters to keep you on your toes).

And the old Spectrum ROMs are easy to remove?

Yes, they come out quite easily if you slide a small flat-bladed screwdriver between the chip and the socket; you just need to be a little bit careful to avoid bending the pins.

Ok - so what sort of extras do the +3e ROMs feature by themselves?

For starters, a lot of the bugs in the original +3 ROMs have been fixed; particularly the CAT command (which doesn't cope well with large disks on the +3) and lots of bugs in the 128K editor. There are some extra commands that let you easily change the colours in the editor as well (SPECTRUM PAPER etc) so you're not stuck with black-on-white.

Snapshot loading has been added recently, so if you copy a .z80-type snapshot onto a

+3 disk, you can run it simply by typing SPECTRUM "chaos.z80" for example. This only works with 48K snaps at the moment, and there may be some bugs, but it does generally do the job and I'm working on improvements.

Finally, I've extended the Speccy's "streams and channels" facility: normally this only works with the screen, printer and keyboard (so you can use PRINT #3 to output to the printer, for example), but now there are extra channels for input/output to memory, variables, disk files and text windows. Probably the most useful of these are the disk file channels (microdrive and most other disk systems have this facility, but not the +3...) and text windows.

As you might expect, text windows can be defined to take up any area of the screen, and you can choose the character size (from 3-8) with extra double-width, double-height and reduced height options. All these size combinations mean you can fit anything from 16x12 to 85x32 characters on the screen! Text can be justified or centred automatically if you like, and there's plenty of other facilities, all accessed by PRINTing special codes to the window streams.

The Spectrum +3e hard disk interface: it's quite simply really...

Windows on the Spectrum! What sort of uses do you think this could be put to?
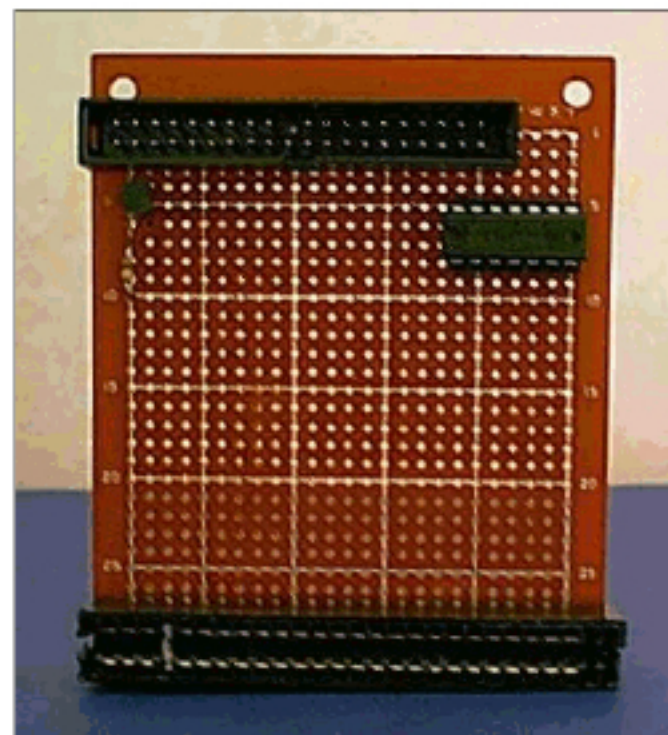
Well, that's up to others! I hope eventually to replace the 128K editor with something a bit more QL-like, with one window used for the listing, one for input and another for output.

Do the +3e ROMs sort out the compatibility issues of the original +3/+2A ROMs with older Spectrum software?

At the moment, no they don't actually improve compatibility, but hopefully they don't make

things worse. I have experimented by replacing the modified 48K BASIC ROM with the one almost identical to the original ROM; this improves compatibility with 48K software (better than any 128K Spectrum), but unfortunately breaks several +3 programs which check changes made to the ROM to tell which machine they're running on (including the Infocom adventure interpreter ZXZVM which is my all-time favourite piece of +3 software!)

Right then; the hard disk interface: is this something you sell?

Absolutely not! I'm not a hardware expert, and my soldering skills are sadly lacking, so I'm afraid anybody who wants a hard disk interface is going to have to build their own, or find somebody else to do it for them. On the plus side, the interface is extremely simple and has minimal connections, so this isn't as arduous as it might be.

I'm aware a lot of people simply aren't able to build even this "simple" interface, however, so I'm looking into the possibility of getting something properly manufactured. It's early days, though, so don't expect anything soon.

The interface - as I understand it - fits onto the Spectrum's edge connector - and into that you can plug a hard disk.

That's right, although it's also possible to make one that plugs into the socket containing the Z80, and so have the entire interface inside the +3 case.

What sort of hard disks are compatible and where can you get them from?

Theoretically any 3.5" IDE hard disk should

work, although I've found that some don't work; I can't explain why. The ones least likely to work seem to be Western Digital and Samsung makes, plus the Quantum Fireball range, and I try to maintain a list of those drives reported to work or not work. I've had all sorts of drives from 85Mb to 8Gb working.

You can get old hard drives from lots of suppliers; a good place to start is Micro Mart. There's no reason I know of that you couldn't put a new 20Gb to 80Gb drive on, but I've not tried that. One thing to bear in mind is that the capacity you get on the +3e will be half what it should be (eg 100Mb on a "200Mb" drive); this is because the interface is 8-bit, and the drives are 16-bit, so we basically throw away half the capacity. If you can fill even 100Mb with Speccy software though, you're a better man than me ;)

What about the components for the interface - I'm thinking of the edge connector in particular - these can't be easy to come by. Do you have source for these or is it a question of salvaging them from old spectrum hardware?

Maplins, Target and other electronics specialists can supply all the components except the edge connector. Yes, you could nick one off some old Spectrum hardware; alternatively, the electronics shops will sell PC edge connectors which you can just saw off to the correct size. If you build the internal interface, you don't need an edge connector at all, of course.

The hard disks themselves: are they easy to work with? Do you use the same commands as for the +3 floppy drive to manage files?

Before you can use the hard disk in normal BASIC commands, you have to format it (using a special new form of the FORMAT command) and then create one or more "partitions". Unlike under such backward systems as the PC where you have to run a special program and then reboot the system, doing this on the +3e is simply a matter of typing (at any time) something like:

NEW DATA "Games",16

to create a new partition called "Games" which is 16Mb in size. The maximum partition size is 16Mb (due to CP/M file system limitations) but you can have as many partitions as you like. There are also commands to delete and rename partitions, should you feel the need.

Once you have some partitions, you have to "map" them to a drive letter, like this:

MOVE "C:" IN "Games"

which makes drive C: refer to the "Games" partition. Now you can use drive C: in any +3 BASIC command, or in any program designed to use +3 files, just as you would with the standard drives A:, B: and M:. You can even make this the default drive with the standard LOAD "C:" command.

To avoid having to do this mapping every time you switch on the +3e, you can make it "permanent", so the +3e automatically does it for you when it starts. For example,

MOVE "D:" IN "Documents" ASN

Now, every time you turn on, drive D: is ready for use (and is shown in the copyright message). Other things you can make permanent are the default drive and colour scheme.

One further feature is that you can re-assign drives A:, B: and M: to other letters, so that drive A: could refer to the hard disk, and E: to the floppy drive etc, whatever you like. This can be useful with some programs that only look on the "A:" drive.

Can you create sub-directories or do the partitions serve that purpose for managing data?

No, you can't have subdirectories in CP/M file systems (which is what +3DOS uses).

How do you map partitions when you've run out of drive letters?!

You just have to "unmap" one partition with, eg,

MOVE "C:" OUT

and then remap the drive letter to another one. In fact, in the current +3e ROMs, it's only possible to map drives to two partitions at a time (although you can use any letters you like); this may be resolved in a future version.

Can you use a +3e hard disk alongside a Plus D/Disciple interface and floppy drive system?

I don't know anyone who's tried this, so I can't say for sure, but I think the Plus D interface that was designed for the +3 should work.

I can see from a picture on your web site that you use an external 3.5 inch floppy alongside your hard disk and the original 3 inch Amstrad drive - what interface and system did you use for this then?

I just plugged it in to the "drive B:" connector on the back of the +3! This will just work as long as it's not a high-density (1.44Mb) drive. There's also some software on the site that allows you to format 3.5 inch disks up to 828K, and also to copy files to and from standard PC DOS disks.

Is powering the hard disk difficult? What sorts of adapters/PSUs do you need?

The easiest thing is to get a power supply from a PC case - even if you have to buy a new case, it's not too expensive. You can normally run two hard disks and an external floppy drive from the same PSU.

Well it all sounds like an immense amount of work has gone into this. Just how long have you been working on this little lot for?

Well, the idea first came about after chatting with John Garner and Dominic Morris at the last NSSS which was November '98, so I suppose it must be about 3 years! Not to say that I've exactly been working on it non-stop, I just tend to do concentrated bursts of stuff and then nothing for ages. But I'd hate to think just how many hours have gone into it ;)

You've given a few hints as to some possible future ideas for the +3e - any other plans as to how this system might be developed?

I've got plenty of ideas, but how many of them will ever reach fruition, I don't know! One thing I would like to do is allow the 128K menu system to be extended so that you could (say) load an application program and then have it available from the menu in the same way as BASIC or the Calculator. It would also be nice to add support for CP/M.

Other thoughts are support for CDROMs and other devices like that, although this would require a full 16-bit interface to be made.

Have many people constructed the +3e? What sort of feedback have you received?

Well I know of at least a dozen, and have also heard that a group of Spanish users were getting together to build a batch between them, so I would imagine we're probably talking 20+ at the moment. Certainly less than 100! How many are using the ROMs without the hard disk interface, I couldn't say.

The feedback I've received has been really positive, mostly just to say they've built the system, but I have had a lot of useful feedback in the form of requests, comments and bug reports etc. Almost all the emails I receive are from non-UK Europeans, particularly the Spanish (so much so, that I now produce a Spanish version of the ROMs, and the website has also been translated).

One final question - what does the 'e' stand for?

Um, enhanced or extended I think. Whatever you prefer!

goto

Essential emulation

Just where should you GOTO for the very best in Spectrum emulation? Hardened emulator enthusiasts will probably know most of this off by heart, but to those of you just returning to the Spectrum scene (welcome, by the way; we've been expecting you), getting your head around the sheer wealth of emulators out there is a daunting task. Of course, covering *all* available emulators in complete detail would be beyond the scope of an entire issue, let alone a single page, but this little top four of mine should get you started. Don't forget, WOS lists just about every emulator for every platform there is (at **www.worldofspectrum.org/emulators.html**).

Emulator	Version (updated)	OS	Spectrum models supported	Cassette interface?	Save to tape (TZX)	Save to disk (DSK)	Input recording	Mimick TV screen	Features
RealSpectrum *Ramsoft* www.ramsoft.bbk.org	0.94.22 (28/04/02)	DOS	All +3e Clones	No	Yes	Yes	Yes (AIR)	Yes	Wide range of hardware supported
ZX32 *Vaggelis Kapartzianis* www.geocities.com/Silicon Valley/Bay/9932/	2.00.04.04 (05/04/02)	Win	All	No	No	No	No	Yes (full screen only)	Easy poke entering
Spectaculator *Jonathan Needle* www.spectaculator.com	2.0 (11/04/02)	Win	48k only	Yes	Yes	n/a	No	Yes	Game help system
SPIN *Paul Dunn and Mark Woodmass* http://homepage.ntlworld.co m/paul.dunn4/SPIN.Zip	0.2a (16/06/02)	Win	All +3e (no IDE support yet)	Yes	No	Yes	Yes (RZX)	Yes	Many planned

ALSO: All emulators support the following formats: .SNA, .Z80, .TAP, .TZX. All emulators except Spectaculator support the +3 .DSK format. All have a go at multicolour effects. RealSpectrum and SPIN access their ROMs externally, allowing you to play with modifications.

exp

The Plus 2 Tape Deck

Not much has been written, it appears, about the +2 integral tape deck. Ok, so it's not the most inspiring of subjects, perhaps, but if you're a +2 user then a faulty casette recorder can mean a pretty much useless computer if you're unfamiliar with this device. Here we take a look at Amstrad's main 'upgrade feature' to Sir Clive's 128k machine.

A built in tape recorder was hinted at by Amstrad right from the time of its purchase of the Sinclair brand name in April 1986, Alan Sugar himself commenting on a "glued on" deck as a possible future feature. This was no enormous surprise; Amstrad's own main competitor to the Spectrum, the CPC 464, had been sporting a built in tape player of its own since its release in 1984. The +2, when it arrived, looked remarkably similar to this computer.

The Amstrad CPC 464

If comments posted to newsgroups and forums are anything to go by, the +2 tape deck was not a popular device. Examining the new machine for the first time at the 1986 PCW show, **Crash**'s Simon Goodwin described the deck then as "rudimentary," whilst Graeme Kidd (editor at the time) wrote that it looked as though "it might first have featured in a cheapo car stereo set-up". Despite Amstrad's experience with built in tape players, the +2's device was 50 per cent slower (rewinding) than the 464's deck and lacked the 464's tape counter. There was, of course, no volume control and there was no auto-stop to protect the deck from damage from tapes left by themselves to

forward/rewind.

And there was no means of connecting an alternative, external player to get around these problems. The +2A (and +2B), very different internally from the original +2, did have a jack socket labelled TAPE/SOUND at the rear, however this was actually the separate sound output for machines connected to monitors rather than TVs; on the +3 disk drive model - virtually identical internally to the +2A - this port did indeed also allow an external tape recorder to be connected, however on the

The Spectrum +2A

+2A (which appeared, of course, after the +3) this feature was not included and the labelling of the port is therefore confusing and misleading.

Tape loading errors experienced by +2 owners aren't necessarily the fault of the machine's tape deck alone. Amstrad's redesign of the actual Spectrum innards was distinctly unsympathetic to many early Spectrum games, the +2A and +3 ROMs being particularly bug-ridden and rendering many early titles instantly incompatible. An external tape player will do nothing to cure

these ills (but a modified ROM might).

Common remedies

For genuine cassette player problems, there *are* things you can do to sort out the difficulties you are experiencing without having to resort to buying a new machine (most of you will interpret 'new' as second hand, but you can in fact still buy an actual new +2A from Sintech - see the ad on page 2). Of course the very first thing you should do is to get rid of all those oxide deposits that have built up over the years and give the tape head a good clean: apply head cleaning fluid (I'm told methylated spirits work also) using a cotton bud and make sure the head has dried properly (through evapouration) before testing. The older tapes get, the dirtier they get, so this could well sort your difficulties out by itself.

The next thing you can try is to adjust the head alignment screw. Shown at point A in the picture below, this little cross-headed screw becomes accessible through a small hole in the case (above the cassette player

controls - shown as point AA) when play has been pressed (ie, the head brought up to the tape) and allows the alignment of the head to the tape to be tweeked to it's 'azimuth' position (where the narrow slit in the head is at 90 degrees to the edge of the tape). You might need a good ear for this to work; the sound produced by the cassette player should become cleaner at the azimuth alignment. If you don't have a good ear, software has been written to help: *The Azimuth Head Alignment Kit* (Interceptor), for example and *Operation Caretaker* (Global), both of which send a stream of data through to the computer from the casette deck, giving you feedback to inform your tweeking - the former can be downloaded from WOS (and recorded to tape from your PC using a utility such as **Taper**). Amstrad also built in an azimuth testing utility into their system diagnostic routine on the +3/+2A (to run this, you need to press and hold down the BREAK key whilst you reset the Spectrum, then - when the test card comes up - simultaneously press and hold down the keys
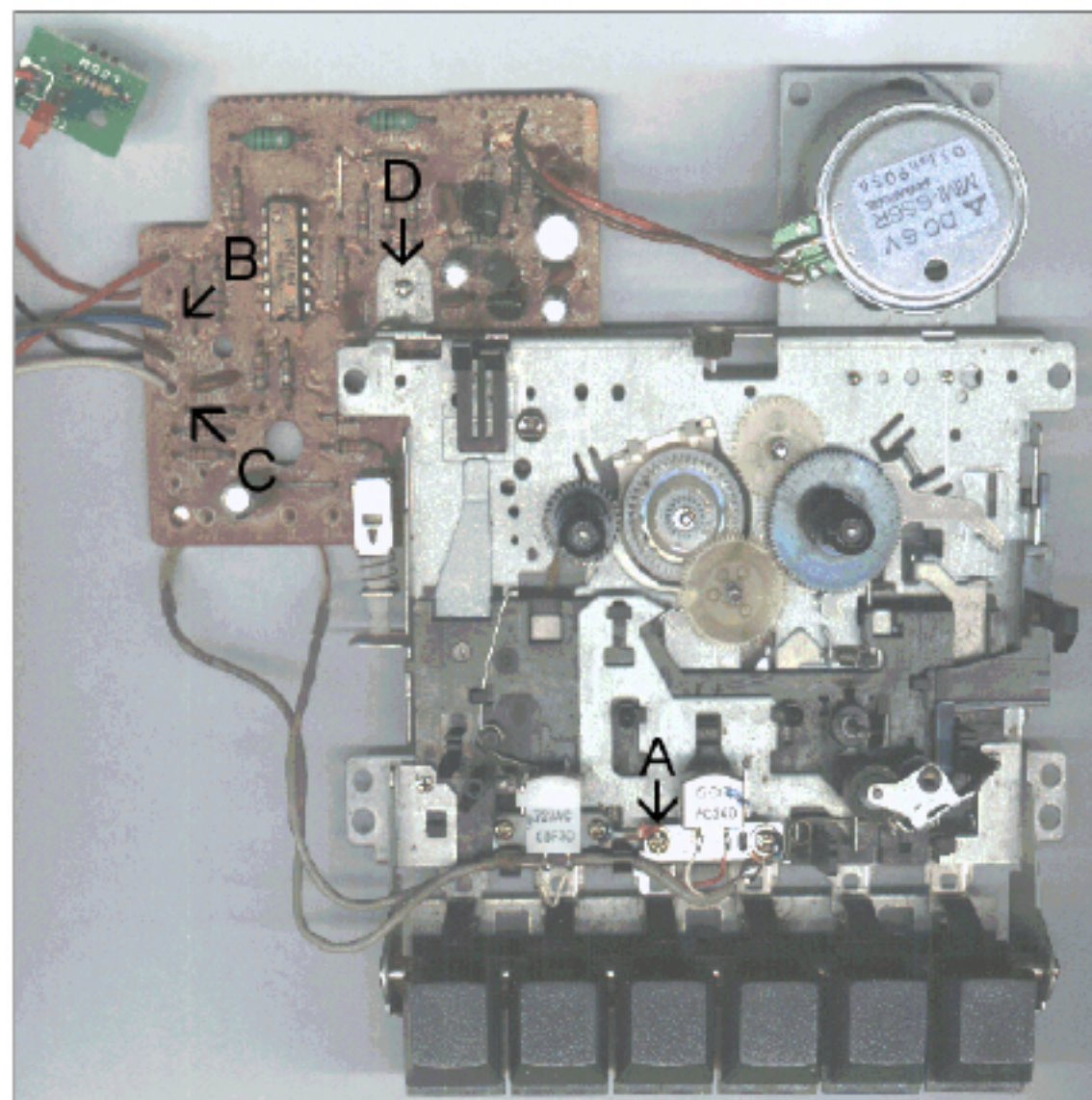
Know thy tape deck

A - The 'azimuth' head alignment screw (accessible when a tape is playing through the hole labelled AA below)

B - Blue - 'PLAY' (ear)

C - White - 'REC' (mic)

D - Earthing screw

q a z p l and *m*), however this requires a special test tape to be inserted and played, on which I can find very little information (*possibly* it's the test tape you can download at **ftp://ftp.worldof spectrum.org/ pub/sinclair/utils/Test Tape.tzx.zip**, but I'm not at all sure of this).

When adjusting the azimuth alignment screw, try to avoid using a magnetised screwdriver; this - over time - could result in the heads becoming magnetised - another possible source of loading problems. Avoiding magnetised screwdrivers is actually easier said than done, since most screwdrivers these days *are* magnetised. You can of course demagnetise heads with this problem using a cassette head demagnetiser (Maplin, for example, sell these at about £2.99 each).

Another common problem, one which can cause the whole tape unit to stop working altogether, can be caused by the earthing screw. Shown at point D in the picture on the previous page (the screw head is on the reverse side of the PCB), this conducting screw passes earth from the chasis of the tape deck to the printed circuit board. If the screw works loose you are likely to experience considerable loading problems; if it works loose to the extent that it no longer makes electrical contact (or if you or one of your Spectrum's previous keepers have replaced the screw with a non-conducting one) the unit will not work at all. Give it a tighten (and make sure it conducts) and, if this was your problem, all should be well again.

Replacing the cassette player

If all else fails you can of course replace the entire cassette deck, using one from another +2 or by buying a new unit from **Sintech**. This is a fairly straightforward task; the unit is secured to the case with six self taping screws and a seventh screw secures the power LED (shown in the top left corner of the main picture). Connection to the main +2 board is via a five pin connector. Decks do vary from issue to issue (variations occur, for

Cassette PCB wiring terminals

301 - motor control (play, FF, RW)
302 - motor power (negative)
303 - as 301 plus motor power (positive)
304 - 5 pin connector: +5v (also to LED)
305 - 5 pin connector: Play (ear)
306 - 5 pin connector: Ground (also to LED)
307 - 5 pin connector: Record (mic)
308 - white (core of record headcable)
309 - red (core of record headcable)
310 - white (core of play head cable)
311 - red (core of play head cable)

*Adapted from information at **www.8bit.ht.st**.*
Note: *on my +2A, 310 & 311 colours are reversed.*

example, in the PCB layout and the cassette gearing system), but these features should remain constant (and are the only ones you need worry about for the purposes of replacement).

Finally, if you're feeling brave and if none of the above suits, you *can* have a go at wiring in an external tape recorder. This isn't something I've done myself, but it seems straightforward enough, from the few discussion board postings I've found that describe the process; of the four wires leading from the cassette PCB to the five pin main board connector, B and C (see main picture) carry the ear and mic signals respectively: from these you could attach 3.5mm (mono) jack leads. But be careful: on my +2A these wires are coloured blue (ear) and white (mic), however another of those variations between decks concerns the wiring colours, so this may not be the case for yours. The relevant terminals (305 for ear, 307 for mic; not forgetting also, of course, 306 for ground) are labelled, however, so finding the right wires shouldn't be too difficult.

And just in case we need to be clear on this, you attempt all these wonderous things at your own risk entirely. Ok? Enjoy!

*Thanks to **Jeff Braine** and **Cliff Lawson** for their help in compiling this article.*

read

<SHAMELESS PLUG> This little read is from my collection at www.cwood-cock.co.uk entitled *Narratives of the Unanticipated.* Get it? If you've got a short, preferably humourous tale that could fill two future pages of ZXF, feel free to send it in. We do do other things, after all. Don't we? </PLUG>

Crash

I was in a plane crash. You might remember the incident. A guy three rows in front of me, whilst tucking into his second helping of crackers and Dairylie, found his way into the cockpit's website on his laptop and uploaded a distracting e-mail to the pilot. The Captain made a short announcement in which he asked us to remain in our seats - it made identifying the bodies so much easier - and thanked as for flying with Air Burgundy. As we plummeted helplessly to our deaths my mind darted back to the ubiquitous safety instructions and cross referenced them with the scenic map provided in every complimentary copy of "The safest way to travel!" in-flight magazine. Our situation was hopeless. We needed water to land in and the nearest to our position was a small pond in the tiny village of Drieselkopf, home of laderhosen and the German burp. So I reasoned thus: by staying in the plane I could be killed by the buckling fuselage, exploding fuel and any number of other factors - even the obese market researcher in the window seat beside me was a potential threat; but by leaving the plane and taking my chances outside, only the ground could get me. So I took my leave of my fellow passengers and threw myself into the whistling air.

A mountain broke my fall. Its uniquely parabolic incline slowed my terminal velocity to a gentle roll, and I came to rest in a daisy-covered field before a quietly grazing cow. Buttercup - for that was her name - took a liking to me instantly and set about licking off the grass stains from my Bopplefield waistcoat that were the only outward signs of my hasty descent. And so, presentable again, I made my way into a small village to seek its elders and my way back home to our glorious realm.

Dwietzgein Finklepompen, mayor for the third year running of this alpine abode, greeted me in his luxurious chambers of oak, leather and expertly crafted formica. He was a round-faced man with a belly as wobbly as jelly and a nose as red as a tulip. With a glass of home made Fochenbeiner and a thick slice of Buttercup pie (it had been her last day in the meadow) he welcomed me to his village and congratulated me on my survival. "My friend," he said, "your presence here is not without its complications. My people have lived here in this valley for centuries, undisturbed by the outside world's influence. In fact, you are the first person from yonder ever to stumble across our very existence since B F Skinner in 1959. Many, many years ago our ancestors discovered that if no roads lead to a place then no-one ever visits it. Keen to establish a harmonious paradise where they could make their sausages in peace, they founded our brave new community up here, where no road would reach us. We lead a simple life: our women keep our homes clean and hunt for us in the forest; our children play happily in the fields to keep the livestock entertained; our men, of course, work daily on the problems of quantum physics - we have our own website accessible only through the key words chicken, Jehovah and Street Hawk. You are in Eden and you must stay; we cannot let you leave our home alive."

Wholeheartedly, I assured the mayor I had no

intention of leaving, and I swore my allegiance to the sacred chipolata there and then. But in the back of my mind I knew I was a rich man: just imagine, I thought, what the papers would pay to get a hold of this one. So I decided to lie low and bide my time.

I adapted to my new life quickly. A beautiful chalet was built for me in the village, and within weeks a wife had been allocated to me to keep it clean and its refrigerator amply stocked with chunks of wild boar. And I soon learned the true feelings of these people. Regularly, at one o'clock after midnight, a tapping at the kitchen door would announce the clandestine arrival of the village youth, keen to hear my adventurous tales of life in western lands. "Is it true what we hear," they would plead, "about democracy, capitalism and Baywatch? Can such things really be?"

"My children," I replied one night, "All these wondrous things and more exist in the world beyond the mountains. I can bring them to you. But first you must help me escape."

"Escape!" they cried in unison (Unison was rather taken aback by this), "Surely you know that's impossible?! The entire valley's surrounded by a quantum field that forces matter particles through an interphase arc of 50 per cent! Hadn't you noticed the purple tint?"

"Purple?" I replied, "I found it more a rose." But my clever social irony went unnoted. "You have much to learn about our ways," I added hastily. "Systems analysts might well say that 'for all problems there are technological solutions,' but, as all good saboteurs say, 'for all technological solutions there is an off-switch'. On the morrow I will ascend the eastern mountain, and when I give the signal you must disable the village power plant long enough for me to pass through the field unharmed. You will know the signal when it happens. Be brave, children. Listen not to the nagging doubts

and parental enquiries that are a natural part of any revolution. When I return you will see that all I have promised is good and true: tomorrow you will eat hamburgers."

My inspiring speech worked wonders. Readily they agreed to my plan and set about the details of their involvement. The power plant was an enormous rhododendron sited just metres away from the mayor's parlour between the turnip patch and the rhubarb penitentiary. Don't ask me how this worked, but all it took was a few bags of lime to render the whole village powerless. The next morning I climbed the eastern mountain and gave my signal (I lit a cigar); sure enough, the purple glow before me vanished and I walked across just as easily as I had walked away from Edith MacGreuger ten years previously upon the shock revelation of her secret passion for Pixel the gunslinger on the Sinclair ZX81.

I returned in a week, the journalists of the world united behind me. Imagine my surprise, dear reader, when we crossed the unprotected boundary to find an empty valley, entirely devoid of any signs of its previous inhabitation. Only Terrance the turkey remained (he had always been stubbornly territorial), still gobbling the hour at seventeen minutes past and greeting humans with his peculiar - yet strangely aesthetic - arrangement of droppings.

And that was where my story had ended until two days ago in a West End McDonalds: who should serve me up my special edition Bambi burger but a red-capped Dwietzgein Finklepompen himself. On the discovery of my escape, he explained, after pointing out this week's competitive shake prices, the village council had called an emergency meeting to vote on immediate action. In the end they had decided on plan D and moved to London to seek employment in the fast food industry. All they had ever wanted, he emphasised, was obscurity, and no-one ever noticed you in that profession.

20 YEARS

1982 - 2002

Sinclair ZX Spectrum